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LUND STATISTICS DAY 2023

Friday, May 26, 2023 MH:Riesz, Matematikcentrum

10:15 – 10:20	Dragi Anevski, Mathematical Statistics, Lund, WELCOME
10:20 – 10:40	Georg Lindgren, Mathematical Statistics, Lund, <i>In search of lost time or Some thoughts about the future</i>
10:40 – 11:00	Henrik Ekström, Mathematical Statistics, Lund, <i>Cellular Automata modelling excitatory and inhibitory neurons</i>
11:00 – 11:30	FIKA
11:30 – 12:00	Jonas Wallin, Statistics, Lund, <i>BottenAda: Predicting the Swedish Election Using a Bayesian State Space Model</i>
12:00 – 13:15	LUNCH AT IKDC
13:15 – 14:00	Lutz Dümbgen, Mathematical Statistics and Actuarial Science, Universität Bern, <i>Isotonic distributional regression and total positivity</i>
14:15 – 14:35	Ivan Hejny, Statistics, Lund, <i>Weak pattern convergence for SLOPE and its robust versions</i>
14:35 – 15:15	FIKA
15:15 – 15:45	Stas Volkov, Mathematical Statistics, Lund, <i>Is coexistence possible for mutual (linear) predators?</i>
15:45 – 15:55	Krys Podgorski, Statistics, Lund, ENDING
17:00 –	DINNER AT LUNDABRYGGERIETS ÖLKÄLLARE

ABSTRACTS

Isotonic distributional regression and total positivity

LUTZ DÜMBGEN

Institute of Mathematical Statistics and Actuarial Science, Universität Bern

The starting point of this talk is nonparametric univariate regression. In the simplest setting, one observes n independent copies of a random pair (X, Y) , and the goal is to estimate the conditional distribution of Y , given X , under the sole assumption that it is nondecreasing (isotonic) in X with respect to the usual stochastic order or the likelihood ratio order. The former estimation problem is well-understood (Moesching and Duembgen 2020, EJS) and has been extended to settings with X lying in an arbitrary partially ordered set (e.g. Henzi et al. 2021, JRSS B). After a brief overview of these results, I will recall some basic properties of the likelihood ratio order of distributions. Then I will explain the connection between the order constraints in the regression context and qualitative constraints on the joint distribution of (X, Y) . In particular, it turns out that the likelihood ratio ordering of the conditional distributions is equivalent to the assumption that the joint distribution of (X, Y) is totally positive of order two (TP2) (Duembgen and Moesching 2023, ESAIM. Prob. Stat.). In the last part, I will describe a maximum empirical likelihood estimator of a TP2 distribution and some of its properties. This is ongoing joint work with Alexandre Moesching and Philip Stange.

Cellular Automata modelling excitatory and inhibitory neurons

HENRIK EKSTRÖM

Centre for Mathematical Sciences, Lund University

We consider a cellular automaton model for the propagation of activity in a neuronal network. The vertices of a square lattice represent neurons, and the edges of the lattice represent the synaptic connections. Each vertex can be active or inactive and is additionally assigned a fixed type, either inhibitory or excitatory, which dictates the effect it will have on its neighbours. We study the spread of activation in a large network and describe possible spatio-temporal limiting patterns depending on the initial activation. The rich palette of the limits with qualitatively different properties, including expanding patterns, fixed patterns, and patterns of constant size moving across the network, allows us to argue that this is a versatile model for the study of associative memory.

Joint work with Tatyana Turova

Weak pattern convergence for SLOPE and its robust versions

IVAN HEJNY

Department of Statistics, Lund University

The Sorted L-One Estimator (SLOPE) is a popular regularization method in regression, which induces clustering of the estimated coefficients. That is, the estimator can have coefficients of identical magnitude. In this paper, we derive an asymptotic distribution of SLOPE for the ordinary least squares, Huber, and Quantile loss functions, and use it to study the clustering behavior in the limit. This requires a stronger type of convergence since clustering properties do not follow merely from the classical weak convergence. For this aim, we utilize the Hausdorff distance, which provides a suitable notion of convergence for the penalty subdifferentials and a bridge toward weak convergence of the clustering pattern. We establish asymptotic control of the false discovery rate for the asymptotic orthogonal design of the regressor. We also show how to extend the framework to a broader class of regularizers other than SLOPE.

In search of lost time or Some thoughts about the future

GEORG LINDGREN

Centre for Mathematical Sciences, Lund University

My new book (actually in Swedish) "Mathematical statistics in Lund - a century of perpetual change" is not a history book but a report of (some) crucial moments in the history of (mathematical) statistics as a science of variation. What were the moments that determined the route to follow (and deviate from) in "probability and statistics and their applications", as the official definition of the subject used to be?

There is no "Conclusions" chapter in the book but I will dare to present in the talk some of my own thoughts about the future.

Is coexistence possible for mutual (linear) predators?

STAS VOLKOV

Centre for Mathematical Sciences, Lund University

Once upon a time, on a remote island nestled in the heart of a tropical paradise, there existed a peculiar coexistence between humans and alligators. Every day either an alligator or a human was chosen, randomly and uniformly from the total population of both. If it was an alligator, then $A > 0$ new alligators appeared on the island. Sadly, it also meant that $B \geq 0$ humans were eaten. On the other hand, if it was a human, then A new humans appeared on the island; which also means that $C \geq 0$ alligators were eaten. If one of the species was eaten completely, it would become extinct (no immigration of either people or reptiles was allowed on the island).

Could both populations sustainably coexist forever, or one of them is bound to become extinct? How does the answer depend on A, B, C ? What if there are more than two species, with some intricate relations between them? The answer to these questions was obtained in a joint work by British, Portugues, and Swedish mathematicians, and I will describe what it is.

BottenAda: Predicting the Swedish Election Using a Bayesian State Space Model

JONAS WALLIN

Department of Statistics, Lund University

"Botten Ada" is a website that utilizes Bayesian modeling to answer the question of who would win the Swedish election if it were held today. In this talk, I will describe the state-space model that we use to estimate the potential voting proportion of each party based on polling data. Additionally, I will provide details on how we utilized the model to predict the 2022 Swedish election, including what worked well and what did not.